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SOCIOECONOMIC FACTORS AFFECTING PARTICIPATION IN WATER-ORIENTED OUTDOOR RECREATION

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PREFACE

This report was developed from research conducted under a cooperative agreement with the University of Missouri. It is part of a continuing program of the Economic Research Service in outdoor recreation research. The program is designed to provide information needed to guide outdoor recreation programs of the Department of Agriculture and other governmental units and to foster the economic development of rural resources to meet increasing demands for outdoor recreation opportunities resulting from growing urban and rural populations with rising incomes and leisure time.

The survey of 1,000 families in St. Louis, Mo., which is analyzed in the report, was made in 1964. The results were tabulated and brought together in 1966 in unpublished form. In the meantime, one of the authors was transferred to other duties outside the State, so publication was unavoidably delayed. However, data of the type collected in the survey are relatively stable--compared with prices, for example--and the conclusions are still valid.

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SUMMARY

Public planners and private investors can estimate demand for water-oriented recreation by assessing the socioeconomic characteristics of a given metropolitan population: annual family income, education, sex, race, age, occupation, and leisure time. In St. Louis, Mo., about 67 percent of 1,000 families interviewed said they participated in such recreation, which occupied one-sixth of all leisure reported.

As family income increased, so did the amount of outdoor recreation. Families headed by white males enjoyed more outdoor recreation than those headed by nonwhites and women. As might be expected, activity decreased with age. Families with high incomes had more leisure and more frequent opportunities for recreation; they also took longer vacations farther from home than low-income families.

Distance to a recreation facility and season greatly affected use. As distance increased, the number of annual trips decreased, but the number of days per trip increased. People in St. Louis said they engaged in more summer recreation--swimming, fishing, picnicking, and the like--than in winter sports such as skating and skiing.

Operators of recreation facilities face high unit costs because of the seasonality of most types of outdoor recreation. Their season might be extended to 6 months or more by combining several types of recreation, such as picnic grounds, fishing facilities, and sightseeing. Almost 90 percent of the respondents said they were willing to pay a fee to use a good recreation facility. The amounts they specified could serve as guidelines for recreation facility operators.

Most respondents preferred well-developed and easily accessible recreation facilities. They wanted running water, sanitary facilities, convenient parking, concession stands or small stores, and picnicking, boating, and swimming facilities. Many also mentioned comfortable motels and restaurants close to a lake or a stream.

SOCIOECONOMIC FACTORS AFFECTING PARTICIPATION IN WATER-ORIENTED OUTDOOR RECREATION

by

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INTRODUCTION

Accurate estimates of recreational demands are of primary importance in planning development of outdoor recreation facilities by State and Federal Governments, as well as by private developers. As a result of pressures created by population growth, higher incomes, shorter workweeks, more leisure time, improved highways, and more automobiles, there is an increasing demand for more and better opportunities to enjoy the outdoors.

In response to these increasing demands, government agencies and private developers need information on the magnitude of recreation demands and the combination of recreation facilities needed to meet them. Previous demands studies based on surveys of people at recreation sites failed to provide data needed for determining the total demand for water-oriented outdoor recreation of a metropolitan population. This study was undertaken to provide information by direct sampling of the St. Louis, Mo., metropolitan population concerning the allocation of leisure time, the type of outdoor recreational activities pursued, and preferences for the type of recreation facilities provided.

The primary objective of this research was to determine if satisfactory primary data on leisure time activities and preferences could be obtained from an interview sample survey of a metropolitan area. Further, these data would be correlated in a statistically significant manner with socioeconomic characteristics widely available from census reports and other secondary sources. Validation of these hypotheses would enable the development of an econometric model capable of predicting the total demand from a metropolitan area for water-oriented outdoor recreation.

This report presents the relationships for leisure time allocation, outdoor recreation activities, and preferences for recreation facilities from a sample of the St. Louis metropolitan population. Relationships between various socioeconomic characteristics and participation in water-oriented outdoor recreation were identified. Analyses of variance were computed for

each relationship to determine the level of significance. Duncan's new multiple range test was used to test significance of the subcategories of each socioeconomic characteristic. A companion report presents results of the second phase, development of the econometric model. 1/

The Sample

Sample Area.--The sample area consisted of St. Louis (City) and St. Louis County. So that the study may be more fully assessed for use in other areas, a brief description of the available outdoor recreation opportunities in the vicinity of St. Louis follows.

There are approximately 150 lakes, private and public, of 5 to 400 surface acres, within a 50-mile radius of the metropolitan center. Within this area, there are also numerous lakes of less than 5 acres, many undeveloped. Within 1 to 2 hours of highway travel time, there are 10 major lakes in the Ozarks offering a total array of water-oriented recreational activities. Lake of the Ozarks, comprising over 59,000 acres, is one of the most highly developed lakes in the region, with most of the adjoining shoreland owned and developed by private individuals. Within less than 150 miles there are 16 well-developed State parks, two national forests (Clark and Mark Twain), hundreds of miles of natural streams and river shoreline, numerous commercial caves, campgrounds, hunting lodges, summer camps, resort motels, riding stables, canoeing access points, springs, and commercial playgrounds.

Sampling Procedure.--A three-stage cluster sample of 1,000 households was drawn at random for the area, using census tracts as primary sampling units. Twenty-five tracts and 25 alternates were drawn--each primary tract having a definite alternate.

In the second stage of the sampling process, the census tracts were divided into segments. The first step was to list the census tracts in St. Louis (City) according to their respective number of households. Census data provided the number of households for each block in the city. These blocks were then grouped into segments of similar size according to a number of households. The segments were then outlined on a map according to similar numbers of households. Each segment in each tract was numbered. The number of interviews to be taken in each tract was proportioned to the number of housing units in that tract. Using cluster sampling with 10 interviews per segment, the number of segments per tract was calculated. A table of random numbers was used to determine the sample segments for each tract.

The interviewers were instructed to obtain data from the head of the household, if possible. In some instances, however, the wife was interviewed. Each interview schedule was numbered with a specific code identifying census tract, segment, and respondent within the segment.

1/ Gillespie, Glenn A., and Durward Brewer, An Econometric Model for Predicting Water-Oriented Outdoor Recreation Demand, U.S. Dept. of Agr., ERS-402, Mar. 1969.

Interviewers were selected and hired in the St. Louis area, and were supervised by a University of Missouri employee. All interviewers were required to attend a training school and conducted at least one interview accompanied by the supervisor.

General Characteristics of the Sample Population

Data concerning the socioeconomic characteristics of the household head and family members were obtained from 1,000 respondents: 419 married males; 419 married females; 41 other males; and 121 other females. 2/ The households were headed by 802 married males, 31 married females, and 167 others. The reader is cautioned to avoid confusion between data presented for "household heads" and data presented for "respondents."

The families interviewed were predominately Caucasian; 96 were Negro and two were of other races. The households contained 3,428 persons, so average family size was 3.4 persons. There was no significant difference in the average family size by race.

Family members ranged in age from less than 1 year to 88 years. The median age was 31.07, compared with 31.57 years for the total population of St. Louis (City) and St. Louis County. 3/ The range in age of the household heads was 18 to 88 years. Approximately two-thirds were less than 54 years old. The mean age was 48 years. Dependent children under 21 comprised the child category.

Almost two-thirds of the families received income from only one source. One-third of the families received income from more than one source, mainly stocks and bonds, social security, real estate, and interest on investments. About half the families (512) had incomes less than $7,000 a year; a third (333) received between $7,000 and $14,000 annually; and about 12 percent (125) received $14,000 or more annually. The mean family income was $8,544 per year.

Twenty-eight percent of the household heads had completed 8 years or less of elementary education; 42 percent had completed 9 to 12 years of school; and 30 percent had completed 13 or more years of education. About 20 percent had college or graduate degrees.

Twenty percent of the household heads were employed in services; 15 percent were laborers; 14 percent were administrators; 11 percent were professional persons; 8 percent were technicians; 7 percent were clerical workers; 7 percent were housewives; 1 percent were unemployed; 4 percent had miscellaneous occupations; and 1 percent refused to answer. Twelve percent of the household heads were retired.

2/ See appendix tables 1 through 6 for data on families sampled.

3/ U.S. Department of Commerce, Bureau of the Census. U.S. Censuses of Population and Housing, 1960, Census Tracts, St. Louis, Mo.-Ill. Standard Metropolitan Statistical Area. pp. 44-45. Washington, D.C., U.S. Government Printing Off. 1962.

PREFERENCES AND SATISFACTIONS FROM LEISURE TIME ACTIVITIES

While outdoor recreation is an important leisure activity, it competes with other activities in the allocation of leisure time. There is relatively little information about the objectives and goals that people seek to attain in their leisure activities; the levels of satisfaction that they generally attain; or the interest in various activities as evidenced by their participation.

An attempt was made in the study to specify desired goals of leisure activity by offering a series of descriptive words and phrases to the respondent for indications of preference. "Relaxation" was a primary goal indicated (table 1). "Fun, pleasure, and amusement" was second for the other male category. The second choice of married respondents was "being with my family" and they also indicated some preference for "exercise" and "physical health." The concepts of sociability and exposure to new and different places, ideas, and people were of importance generally.

Respondents were also asked to indicate their satisfaction with their current leisure activities. Complete satisfaction was indicated by 41 percent; 40 percent were "generally satisfied" and 19 percent were "somewhat dissatisfied" (table 2).

Many reasons were given for complete satisfaction. However, the two principal responses were: "we are doing what we like to do" and "we are satisfied and contented." Apparently, people make a choice among recreation activities and usually are satisfied with the results.

The respondents who were only partially satisfied with their recreation activities indicated "lack of adequate time," "not enough money," and "poor health" as being important restraining factors. "One is never completely satisfied" was also mentioned. Lack of facilities and parks was mentioned by several respondents, indicating a demand for additional development in the area. Table 3 shows the percentage distribution of reasons given for varying degrees of satisfaction.

People with adequate incomes and leisure are generally satisfied with their recreational choices and enjoy them. No respondents in this category indicated "lack of facilities" as a limitation, because they could seek out the recreation sites with the types of facilities and services they desired. Most of this group indicated that "being with the family" was important. Their responses were similar to those in the category of other single males and females who listed "being alone" as an important factor preventing satisfaction from recreation activities. The people who indicated time and money as constraints also felt that facilities were inadequate, showing lack of time and money necessary to seek out the recreation facilities desired.

Among indoor activities, about 90 percent watched television; numerous other activities registered a wide following (table 4). Approximately two-thirds of the sample, including nearly 81 percent of the children, participated

Table 1.--Desired goals of respondents for leisure activities, St. Louis, Mo., metropolitan area

Desired goals	Married male	Married female	Other male	Other female	Total
	Percent				
Relaxation	43.9	43.2	39.0	42.2	43.2
Fun, pleasure, amusement	13.8	14.8	29.3	8.3	14.2
Being with my family	18.3	19.3	7.3	23.1	18.9
Companionship, sociability	4.3	5.1	4.9	8.3	5.3
Exercise, physical health	5.0	3.1	--	0.8	3.5
Improvements around the house	1.4	0.7	4.9	--	1.1
Learning about new places, new things, or new ideas	4.3	4.3	--	5.8	4.3
Learning something useful for my work	0.7	0.7	--	0.8	0.7
Extra income	1.0	1.0	--	4.1	1.3
Developing some kind of skill	1.0	1.4	--	--	1.0
Developing a hobby	0.5	0.7	--	0.8	0.6
Doing something different	4.1	4.6	9.8	5.0	4.6
Other	0.7	0.7	2.4	0.8	0.8
Refused to answer	1.0	0.4	2.4	--	0.5
Total	100.0	100.0	100.0	100.0	100.0

Table 2.--Satisfaction of respondents with leisure activities, St. Louis, Mo., metropolitan area

Answer	Frequency of response				Total
	Married male	Married female	Other male	Other female	
	Percent				
Completely satisfied	19.5	15.0	1.3	4.7	40.5
Generally satisfied	14.8	18.8	1.8	4.6	40.0
Somewhat dissatisfied	7.0	8.0	0.9	2.8	18.7
Refused to answer	0.6	0.1	0.1	0.0	0.8
Total	41.9	41.9	4.1	12.1	100.0

Table 3.--Reasons given by respondents for varying degrees of satisfaction from leisure activities, St. Louis, Mo., metropolitan area

Reasons	Completely satisfied	Generally satisfied	Somewhat dissatisfied
	Percent		
Not enough time	0.7	27.5	40.1
With family, children along	12.1	6.8	3.2
Doing what I (we) like to do	47.7	19.0	0.5
Learning about new things	1.0	0.8	--
Not enough money	--	5.8	11.8
Just satisfied and contented	35.6	8.3	--
Lack of facilities and parks	--	5.0	6.4
Getting away, out	2.2	1.3	--
One is never completely satisfied	--	14.4	8.7
Tired, disgusted, dissatisfied	--	1.5	5.3
Would like to travel more	--	3.3	5.9
Poor health, unable to do things	0.2	4.8	13.9
Alone	--	--	3.7
No response	0.5	1.5	0.5
Total	100.0	100.0	100.0
	Number		
Total responses	405	400	187

in some form of water-oriented outdoor recreation. Proportions of persons participating in selected outdoor recreation activities are presented in table 5.

The results indicate that water-oriented outdoor recreation is one of the important leisure activities in the St. Louis metropolitan area. The people in this area generally seek to relax and be with their families and are generally satisfied with their leisure activities. Some are constrained from complete satisfaction by deficiencies in time, money, or health.

Table 4.--Participation in indoor recreation activities, St. Louis, Mo., metropolitan area

Type of activity	Adult males	Adult females	Children 1/
	Percent		
Watching TV	87.8	89.2	91.5
Going to a movie	32.7	35.1	53.7
Reading for enjoyment	61.6	67.4	46.2
Social visiting	56.4	62.4	39.6
Attending a study or discussion group	12.9	18.2	7.7
Playing cards, playing bridge	50.1	50.3	23.2
Dancing	20.2	20.6	29.9
Bowling	26.9	19.2	25.9
Playing a musical instrument	8.5	8.9	22.5
Going to a concert or play	17.6	22.3	19.6
Listening to phonograph records	45.4	48.4	69.5
Attending a club or organization meeting	26.2	29.7	18.1
Other	12.4	14.0	13.9

1/ Dependents under 21 years.

Table 5.--Participation in outdoor recreation activities, St. Louis, Mo., metropolitan area

Type of activity	Adult males	Adult females	Children 1/
	Percent		
Water-oriented recreation activities	63.4	54.9	80.9
Sightseeing, auto ride	61.6	67.9	57.7
Walking for pleasure	32.5	36.3	30.2
Playing or watching a football game	34.9	16.6	42.6
Playing or watching a baseball game	57.0	35.1	53.8
Playing or watching a tennis game	9.5	7.1	15.8
Playing or watching a badminton game	12.2	11.7	20.1
Other	33.7	20.3	35.4

1/ Dependents under 21 years.

SOCIOECONOMIC CHARACTERISTICS AND RECREATION ACTIVITIES

The socioeconomic factors related to the head of the household found to influence family participation in water-oriented outdoor recreation were family income, education, sex, race, age, occupation, and leisure. Except for leisure time, these factors have proved significant in studies of economic demand. Some of these variables are interrelated and the combined effects are perhaps more important than individual relationships. However, for purposes of this discussion, each variable will be considered separately.

Family Income

As a family moves up the income scale, recreation activity correspondingly increases. The number of trips per family for outdoor recreation varied from 1.2 per year for those receiving under $1,000 to 8.3 trips for those with $20,000 or more income. The average number of recreation days per year was also greater in the higher income levels (table 6). Significance between different levels of income and recreation activity is shown in appendix table 2.

Table 6.--Travel activities of families by income groups, St. Louis, Mo., metropolitan area

Family income	Average recreation days per family	Average number of trips per family
Under $1,000	9.1	1.2
$1,000-$2,999	7.8	1.6
$3,000-$4,999	14.1	2.9
$5,000-$6,999	27.4	5.3
$7,000-$9,999	27.8	6.5
$10,000-$13,999	34.6	6.7
$14,000-$19,999	39.1	6.7
$20,000 +	65.2	8.3
Y*	29.4	4.8
All groups	27.0	5.1

Y*--Did not answer question on family income, but did indicate recreation activity.

Analysis of variance of recreation activity by income indicated that the means vary significantly at the 1-percent level (F ratio, 14.379).

Significance between each of the individual means is indicated in appendix table 2.

Income also influenced participation in individual activities. For swimming, water skiing, boating, boat fishing, sightseeing, golfing, and hiking, participation trended up for each increase of income in the total range. Each

activity increased, but at varying rates. Camping, picnicking, and nature walks increased up to $5,000, then leveled off. Bank fishing remained approximately the same for all groups (table 7).

There was a significant positive relationship between family income and outdoor recreation activities. Kendall's coefficient of rank correlation gave an r value of 0.976. The result reflected not only the influence of available funds but also other socioeconomic characteristics such as education, age, and occupation that were related to level of income. Of the professional group, 57.5 percent and of the administrator group, 75.4 percent--the occupations showing highest outdoor recreation activity--had incomes over $10,000.

Families with incomes below $3,000 comprised a relatively high proportion of older people. Of the household heads reporting income below $3,000, almost 70 percent were 60 years or older.

Variations in income did not account completely for differences observed in participation rates among racial groups. In the segment of the population with incomes below $5,000 were 26 percent of Caucasian families, compared with 61.5 percent of Negro families. Only 9.9 percent of Caucasian families received less than $3,000 per year compared with 24.0 percent of Negro families. Of all Negro families, 85.4 percent listed annual family incomes of less than $7,000 per year. Fewer than half the Caucasian families (47.6 percent) made less than $7,000 per year.

The mean income of all respondents was $8,544. Almost 90 percent of the Negro families reported incomes below the mean. To make a valid comparison between races, it was necessary to determine the activity and participation rates of families at the same income levels. At each level where comparison was possible, the rate was higher for Caucasians than for Negroes. The activities of both groups increased with incomes up to $10,000 (table 8). Above this level, the rate continued to increase for Caucasians, but declined for Negroes.

Education of Household Head

As the years of schooling increased, the days of recreation increased (table 9). Significance between different levels of education and recreation activity is shown in appendix table 3. Recreation activity between elementary, high school, college, and graduate levels of education differed significantly. People with more education tend to have better jobs and, consequently, higher incomes.

About 27,000 recreation days were reported. Families headed by individuals who had some college education and were earning more than $7,000 accounted for 37.4 percent of the recreation days. Families whose household heads had had only an elementary education and were earning more than $7,000 accounted for 4.9 percent of the recreation days. Both education and income apparently affect the rate of participation in recreation activities and education does stimulate participation (table 10).

Table 7.--Water-oriented outdoor recreation activity by family income groups, St. Louis, Mo., metropolitan area

Family income	Type of water-oriented outdoor recreation activity														
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other	Average
	Days per family														
Under $1,000	--	--	--	--	1.9	--	0.2	3.2	1.7	2.1	--	--	--	--	9.1
1,000-2,999	1.1	0.4	--	0.3	1.3	0.6	1.0	1.1	0.1	1.3	0.3	--	0.2	0.3	7.8
3,000-4,999	1.5	0.1	--	0.8	2.1	1.0	1.1	2.3	0.5	3.0	1.3	--	0.4	0.1	14.1
5,000-6,999	3.4	0.5	.03	1.4	3.6	1.9	2.8	3.6	1.4	4.8	2.2	0.3	0.8	0.9	27.4
7,000-9,999	4.1	0.6	.01	1.2	3.7	2.5	3.2	3.1	1.7	4.7	1.6	0.1	1.0	0.4	27.0
10,000-13,999	5.4	1.1	.10	1.4	3.3	3.7	3.5	3.1	0.8	6.3	2.5	0.4	1.8	1.1	34.6
14,000-19,999	6.7	1.0	.05	1.4	4.5	4.6	2.7	2.4	0.4	7.2	2.6	1.0	3.0	1.7	39.1
20,000 +	13.7	3.9	--	1.2	3.7	7.7	6.6	2.0	1.7	10.8	4.9	3.4	2.9	2.8	65.2
Y*	4.2	1.4	--	1.6	2.7	2.4	2.2	2.5	0.3	6.5	2.5	0.2	1.9	0.1	29.4
All families	4.1	0.8	.03	1.1	3.1	2.5	2.6	2.7	1.0	4.9	1.9	0.4	1.1	0.7	27.0

Y*--Did not answer question on family income but did indicate recreation activity

Analysis of variance of recreational activity by years of formal education indicated that the means vary significantly at the 1-percent level (F ratio 14.379).

Significance between each of the individual means is in appendix table 2.

Table 8.--Days per family of water-oriented outdoor recreation activity by race of household head and income, St. Louis, Mo., metropolitan area

Family income	White	Negro	Other	Average per family, all groups
	Days			
Under $1,000	19.2	1.0	0	9.1
$1,000-$2,999	8.8	3.2	0	7.8
$3,000-$4,999	16.7	3.4	6.0	14.1
$5,000-$6,999	28.7	15.9	0	27.4
$7,000-$9,999	28.1	24.1	0	27.0
$10,000-$13,999	35.2	14.0	0	34.6
$14,000-$19,999	39.6	23.0	0	39.1
$20,000 and over	67.0	13.5	0	65.2
Y*	29.4	0	0	29.4
Average number of days per family	29.0	8.7	3.0	27.0

Y*--Did not answer question on family income, but did indicate recreation activity.

The effects of education on individual recreation activities varied. Swimming, boating, sightseeing, nature walks, and golfing increased at a relatively constant rate as the level of education increased. Water skiing and hiking remained relatively constant for the first 12 years of school, and then increased with additional schooling. Camping, picnicking, boat fishing, and bank fishing remained relatively constant for all education levels. The effect of education on total water-oriented outdoor recreation was evident; some activities were affected more and at varying rates that others.

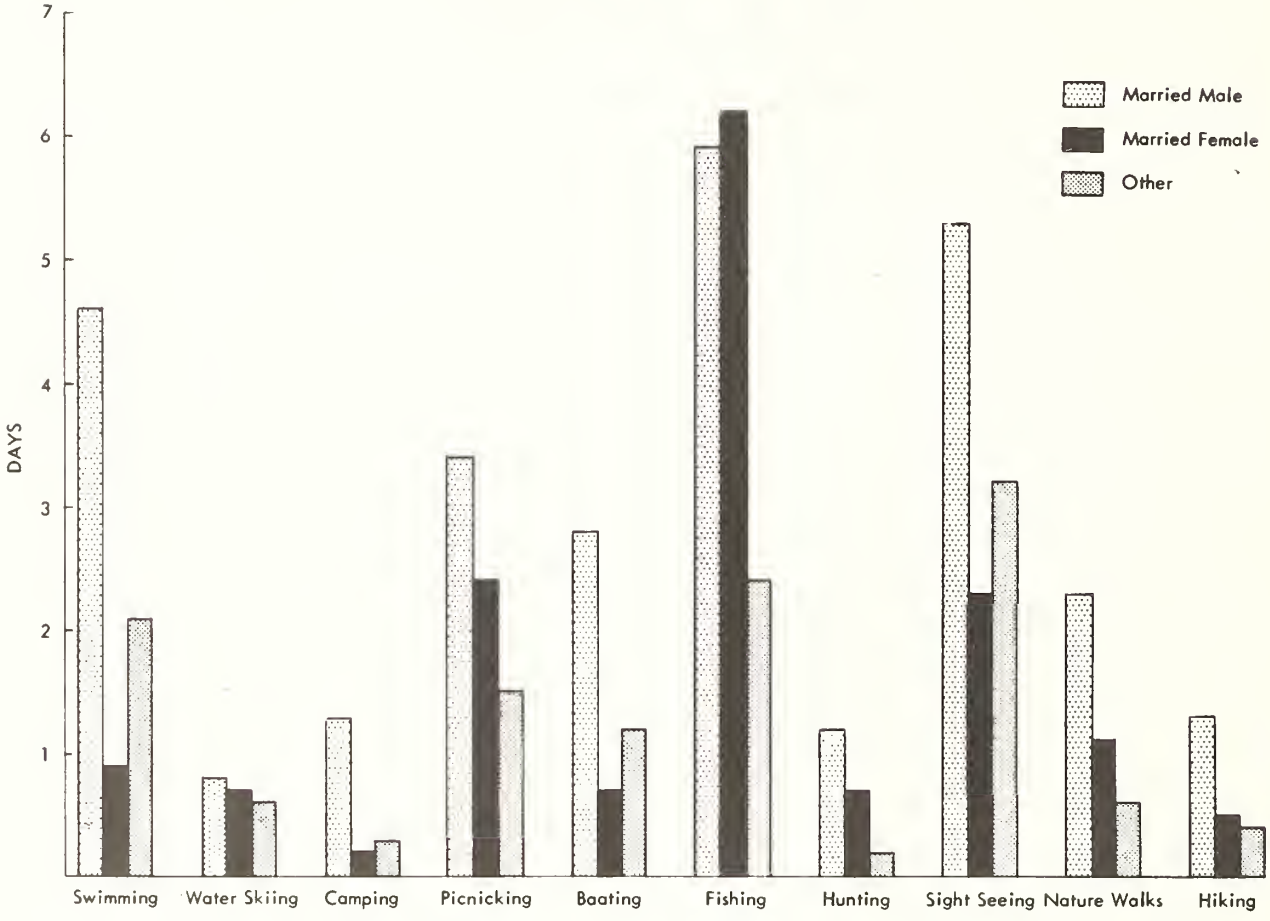
Sex of Household Head

The sex of the household head influenced family recreation activity. Families headed by married males participated in recreation 30 days per year. Families headed by married females participated 16.3 days per year, and families classified as other, 13.8 days. The differences in participation were not uniform. The time spent in various activities differed markedly for families of married males, married females, and other household heads.

Families headed by married males were most active in swimming, water skiing, camping, picnicking, boating, bank fishing, sightseeing, nature walks, golfing, and hiking. Families headed by married females were most active in boat fishing, and exceeded the activity of families of other household heads in water skiing, picnicking, bank fishing, boat fishing, hunting, nature walks, and hiking. The differences are shown in figure 1. The variations were significant at the 1-percent level.

In regard to specific family member participation in 14 major activities, the breakdown was for adult males, adult females, and children, with a further

FIGURE 1.--DAYS OF RECREATION PER FAMILY, BY SEX OF HOUSEHOLD HEAD, ST. LOUIS, MO., METROPOLITAN AREA



breakdown of children by age groups. More children than adults participated in all activities except fishing and sightseeing. Swimming, sightseeing, and picnicking were the most popular activities of all family members. Water skiing and ice skating were the least popular (table 11).

Race of Household Head

Approximately 90 percent of the households surveyed were whites, and 10 percent nonwhite, with 9.6 percent Negro and 0.2 percent classified as other. Water-oriented outdoor recreation participation by Negroes in the St. Louis area was considerably below that of whites (table 12). Participation rates of Negro and Caucasian families in all 14 activities were significantly different at the 1-percent level.

Table 9.--Annual recreation days per family, distribution of families, distribution of family recreation days, by education and income of household head, St. Louis, Mo., metropolitan area

Item	Education			
	Elementary	High school	College	Total
	Days			
Annual recreation days per family with incomes:				
More than $7,000	28.6	31.2	41.4	--
Less than $7,000	16.0	19.0	28.5	--
	Percent			
Distribution of families with incomes:				
More than $7,000	4.6	16.8	24.4	45.8
Less than $7,000	22.4	23.9	4.4	50.7
No response	--	--	--	3.5
Total	27.0	40.7	28.8	100.0
Distribution of family recreation days with incomes:				
More than $7,000	4.9	19.5	37.4	61.8
Less than $7,000	13.3	16.8	4.7	34.8
No response	--	--	--	3.4
Total	18.2	36.3	42.1	100.0

Even though participation of Caucasians was greater than that of Negroes, the general patterns of activity were closely associated. Spearman's coefficient for rank correlation showed a high degree of correlation for the overall pattern of participation between the races, although at a lower rate. 4/ In comparing activity participation rates, swimming, picnicking, sightseeing, and fishing were highest for both groups.

Age of Household Head

Families of household heads under 30 years of age had a lower participation rate than those headed by people 30 to 55 years old (appendix table 4). Young household heads generally have small children, and are limited to fewer leisure

4/ Spearman's coefficient of rank correlation:

$$r_s = 1 - \frac{6 \Sigma d^2}{n(n^2-1)} = 1 - \frac{6(108)}{14^3-14} = 0.763$$

Table 10.--Water-oriented outdoor recreation activity by education of household head, St. Louis, Mo., metropolitan area

Years of school	Type of water-oriented outdoor recreation activity														
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other	Average
	Days per family														
1-4	2.6	0.3	--	0.7	0.5	1.2	2.9	1.5	0.6	2.3	0.2	--	0.6	0.1	13.5
5-7	0.8	0.1	--	0.6	1.4	1.1	1.4	2.2	0.6	3.5	0.8	--	0.2	0.1	12.7
8	2.4	0.2	--	1.2	3.0	1.4	2.3	3.1	1.2	3.5	1.7	--	0.7	0.3	21.0
9-11	3.2	0.6	--	1.1	3.1	2.5	3.3	2.9	1.3	2.6	1.3	--	0.4	0.8	23.3
12	3.7	0.6	.02	1.3	3.2	1.8	2.1	2.6	0.9	5.1	2.0	0.1	0.9	1.0	25.3
13-15	6.2	1.5	--	1.3	3.8	4.1	3.5	3.6	0.9	6.3	2.9	1.5	2.7	0.9	38.8
16	5.8	1.2	.10	1.0	3.6	3.5	2.3	2.5	1.5	7.7	2.2	0.8	1.5	1.2	34.9
17 +	9.2	2.1	.04	1.1	3.8	5.6	4.2	2.1	0.3	7.6	3.9	1.7	3.1	0.8	45.5
Y*	2.3	0.3	--	--	0.2	1.3	2.7	2.6	--	1.3	--	--	--	--	10.8
All families	4.1	0.8	.03	1.1	3.1	2.5	2.6	2.7	1.0	4.9	1.9	0.4	1.1	0.7	27.0

Y*--did not answer question on education but indicated recreation activity.

Analysis of variance of recreational activity by years of formal education indicated that the means vary significantly at the 1-percent level (F ratio, 6.469).

Significance between each of the individual means is indicated in appendix table 3.

Table 11.--Distribution of adults and children participating in water-oriented outdoor recreation activities, St. Louis, Mo., metropolitan area

Individuals or age groups	Type of water-oriented outdoor recreation activity													
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other
	Percent													
Husband	50.7	6.4	5.3	15.4	66.4	36.9	31.3	39.0	18.2	72.6	36.2	14.8	16.4	10.4
Wife	45.3	3.1	6.1	11.6	66.2	30.6	15.0	22.6	1.7	73.8	37.2	4.8	14.4	8.0
0-5 years	60.4	2.5	7.5	17.5	77.9	29.2	11.7	18.3	0.8	70.4	35.8	0.4	13.8	5.0
6-11 years	88.6	4.2	27.3	26.0	85.8	41.2	20.8	40.1	4.8	78.2	46.7	3.1	23.5	14.5
12-17 years	90.9	15.6	38.5	30.2	82.5	41.1	25.8	42.5	12.0	80.0	48.4	7.6	30.2	18.9
18-21 years	80.6	20.0	28.3	17.2	57.8	38.9	20.6	26.1	13.9	69.4	30.6	12.8	18.9	20.6

Analysis of variance of recreation activity by sex (refers to husband and wife) of the household head indicated that the means vary significantly at the 1-percent level (F ratio, 18.85).

Table 12.--Water-oriented outdoor recreation activity by families of different racial origins, St. Louis, Mo., metropolitan area

Race	Type of water-oriented outdoor recreation activity														
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other	Total
	Days per family														
White	4.4	0.8	.02	1.2	3.3	2.7	2.9	2.9	1.1	5.1	2.1	0.4	1.2	0.7	29.0
Negro	0.8	--	.07	0.2	1.2	0.3	0.5	1.1	0.4	2.4	0.2	0.2	0.1	1.2	8.7
Other	--	--	--	1.0	--	--	--	--	--	1.0	0.5	--	0.5	--	3.0
All families	4.1	0.8	.03	1.1	3.1	2.5	2.6	2.7	1.0	4.9	1.9	0.4	1.1	0.7	27.0

Analysis of variance of recreation activities by race of household head indicated that the means vary significantly at the 1-percent level (F ratio 20.65).

hours per week than those in the older age groups. From 30 to 55 years of age, the rate of participation was almost constant, with the decline starting at age 55. This was true for all activities except sightseeing. Another sharp decline occurred at 70 years.

Age means more than physical capacity. As children mature, outdoor recreation activities are affected. Interests change with the life cycle. Activities of primary interest when children are young give way to those preferred by the husband and wife. Swimming, water skiing, boating, camping, and hiking decline with advancing age. Each activity declined at varying rates. The sharpest decline occurred at 55 to 59 years (table 13).

The decline is not as marked in the less strenuous activities--golfing, nature walks, sightseeing, fishing, picnicking--as in the more strenuous ones. Many people continue the less strenuous activities until age 70 (figure 2). Reduced participation in the more strenuous activities in later years undoubtedly paralleled the decline in physical capacity.

Occupation of Household Head

Occupation influenced recreation activities such as swimming, water skiing, boating, sightseeing, nature walks, and hiking substantially. Professional people and administrators spent more time at these pursuits than clerical and service workers. Unemployed persons were the lowest in participation (table 14).

Many of the occupational differences in participation in water-oriented outdoor recreation appears to be associated with variations in income, education, and leisure. Generally, people in the administrative and professional categories have higher incomes, are better educated, and have longer paid vacations than people in other groups. Seventy percent of the administrators and professional people had some college education; 50.3 percent had college degrees, compared with 8 percent of the labor, clerical, housewife, unemployed, technical, and service groups. Daily leisure time for administrative workers and professionals is often less than for other occupations, but longer vacations and the chance to take an extra day for long weekends was certainly reflected in their participation in water-oriented outdoor recreation. Analysis of variance indicated that occupation affected recreation activity significantly (table 14). The significance between occupations is shown in appendix table 5.

Leisure Time of Household Head 5/

Analysis of outdoor activities indicated a relationship between leisure hours per week of the household head and specific recreation activities. Swimming, camping, picnicking, sightseeing, nature walks, and hiking increased with an increase in leisure time per week until 50 hours was reached, followed

5/ Leisure time is discretionary time to be used as one chooses. It excludes existence and subsistence time, i.e., time for eating, sleeping, working, and business or necessary travel.

Table 13.--Water-oriented outdoor recreation activities of families by age of household head, St. Louis, Mo., metropolitan area

Age of household head	Recreation days per family (annual)
Under 20 years	2.0
20-24	29.6
25-29	21.7
30-34	31.2
35-39	32.9
40-44	33.5
45-49	32.8
50-54	32.8
55-59	22.5
60-64	20.3
65-69	23.9
70-74	14.8
75 +	12.3
Y*	10.0
All families	27.0

Y*--Did not answer question on age.

Analysis of variance of recreation activity by age of household head indicated that the means vary significantly at the 1-percent level (F ratio, 2.23). Significance between each of the individual means is indicated in appendix table 4.

by a gradual decline. Water skiing and ice skating also declined at 50 hours. Boating, fishing, and hunting remained relatively constant as leisure time increased until the 60-hour level was reached, and then declined rapidly (table 15).

An increase in the leisure hours of household heads who have less than 50 hours of leisure per week would significantly affect recreation activity. The increased activity per leisure hour added is considerably greater in the lower categories than among those who already have considerable leisure time. The number of families, by leisure hours per week and the significance between levels of leisure time and recreation participation are indicated in appendix table 6.

To obtain an estimate of their desires, respondents were asked what they would like to do if they had more leisure time. Approximately 42 percent said they would participate in some form of recreation; 18 percent would spend more time inside; 14 percent, more time outdoors; 7 percent, in both indoor and outdoor activities; while 15 percent indicated that they would use the time for work.

FIGURE 2.--DAYS OF RECREATION PER FAMILY BY AGE OF HOUSEHOLD HEADS ST. LOUIS, MO., METROPOLITAN AREA

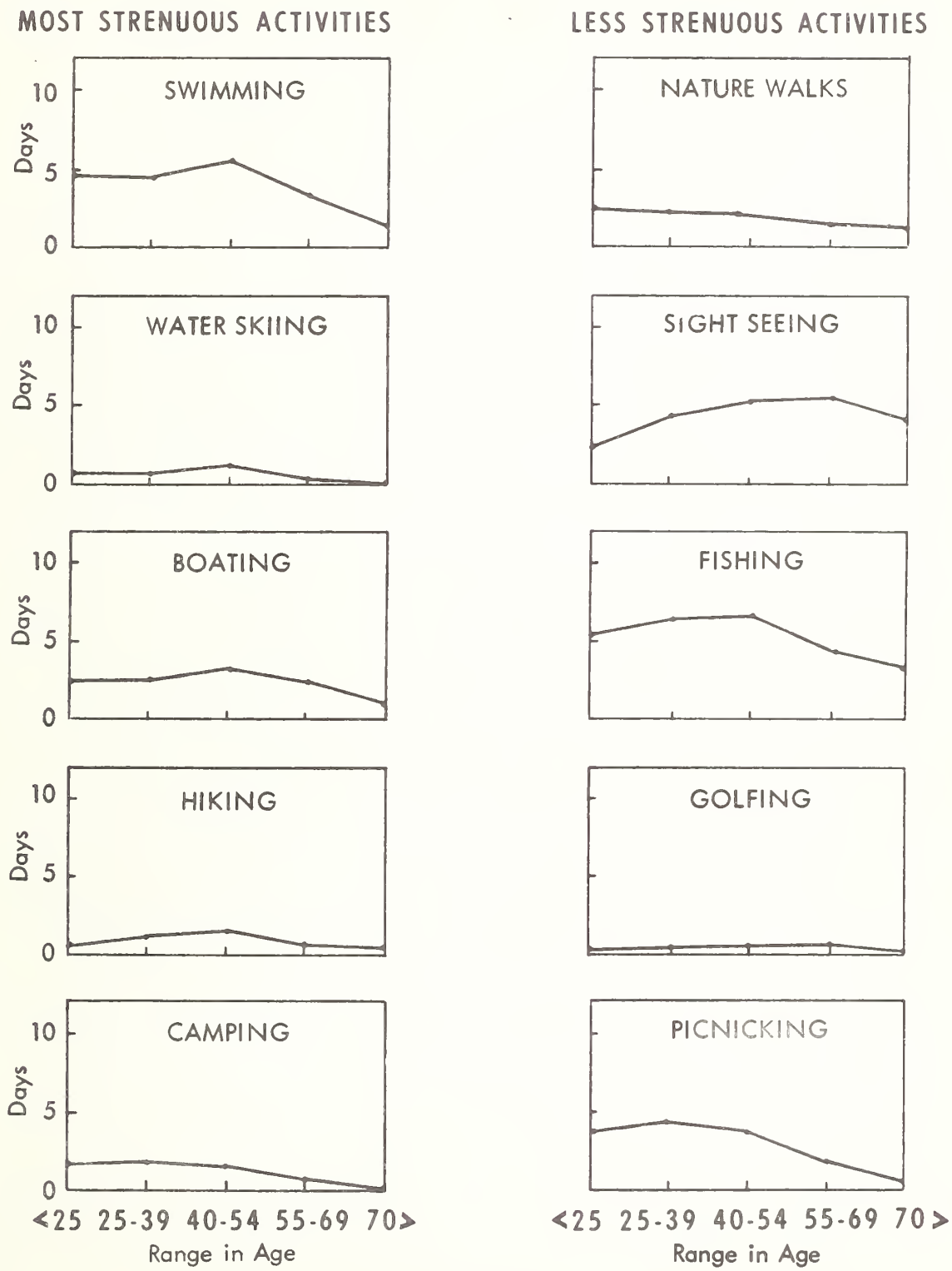


Table 14.--Water-oriented outdoor recreation activities by occupation of household head, St. Louis, Mo., metropolitan area

Occupation	Type of water-oriented outdoor recreation activity														
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other	Average
	Days per family														
Professional	6.3	1.5	--	1.1	4.1	3.8	3.4	2.7	1.2	6.9	3.3	0.2	2.0	0.6	37.1
Administrator	5.5	1.9	--	1.1	3.4	4.0	2.5	2.5	0.8	6.7	2.6	1.1	2.3	1.3	35.7
Technical	4.6	0.5	--	1.3	4.2	2.8	3.0	3.6	1.4	4.7	1.7	0.4	1.1	0.7	30.0
Services	4.5	0.7	0.1	1.3	3.8	2.7	2.3	2.7	1.1	4.6	2.0	1.6	1.3	0.8	28.1
Clerical	3.2	0.6	--	1.0	2.1	1.6	1.3	1.6	1.7	3.2	1.5	0.1	0.9	0.3	19.1
Laborer	3.1	0.3	--	2.1	3.7	1.7	3.2	3.8	1.6	4.4	1.5	--	0.5	1.3	27.2
Housewife	1.5	0.8	--	0.2	1.4	1.2	0.7	11.2	--	2.7	0.6	--	0.2	0.5	11.0
Unemployed	2.6	--	--	0.6	2.1	0.5	0.5	2.1	--	1.9	0.8	--	0.3	--	11.4
Other	3.1	0.1	--	0.4	1.4	2.0	3.1	2.8	0.4	4.9	1.7	1.0	0.6	1.0	21.7
Y*	2.8	--	--	0.5	2.0	1.4	8.9	3.5	0.1	2.0	0.7	--	0.7	--	23.2
All families	4.1	0.8	--	1.1	3.1	2.5	2.6	2.7	1.0	4.9	1.9	0.4	1.1	0.7	27.0

Y*--Did not answer question on occupation.

Analysis of variance of recreation activity by occupation of the household head indicated that the means vary significantly at the 1-percent level (F ratio, 2.832).

Significance between each of the individual means is indicated in appendix table 5.

Table 15.--Water-oriented outdoor recreation activity by leisure hours per week of the household head, St. Louis, Mo., metropolitan area

Leisure hours	Type of water-oriented outdoor recreation activity														
	Swimming	Water skiing	Ice skating	Camping	Picnicking	Boating	Fishing (boat)	Fishing (bank)	Hunting	Sightseeing	Nature walks	Golfing	Hiking	Other	Average
	Days per family														
1-9	2.8	--	--	0.9	1.3	1.9	--	0.7	1.3	4.7	1.4	--	0.4	0.4	15.8
10-19	4.7	2.5	--	1.4	2.8	3.9	2.3	1.8	1.8	3.3	1.0	0.1	0.9	0.9	27.4
20-29	4.6	0.9	--	0.5	2.9	3.3	2.9	3.3	2.1	4.7	2.4	0.2	2.0	0.7	30.4
30-39	5.3	1.5	0.1	1.2	3.8	2.8	2.5	2.8	0.7	5.6	2.6	0.3	1.4	1.2	31.9
40-49	4.8	0.8	0.1	1.9	4.2	2.8	2.8	3.0	1.1	6.0	2.3	0.3	1.4	0.9	32.3
50-59	4.0	0.6	--	1.4	3.5	2.8	4.0	3.5	1.4	3.8	1.6	0.7	1.0	0.7	29.0
60-69	1.0	--	--	0.5	1.5	0.4	0.7	1.9	0.8	3.4	0.9	0.1	0.6	0.2	11.7
70-79	1.3	--	--	0.3	1.9	0.6	0.3	1.1	0.1	1.9	0.1	0.8	--	0.4	8.6
80 +	1.7	0.1	--	0.1	0.3	0.3	0.7	1.2	0.1	1.3	0.3	--	--	--	6.2
Y*	0.3	0.2	--	0.2	0.2	0.2	0.2	--	0.1	0.8	--	--	0.2	--	2.5
Av. days per family	4.4	0.9	.03	1.3	3.4	2.7	2.7	2.8	1.1	4.9	2.0	0.3	1.2	0.8	--

Y*--Did not answer question on leisure hours but did indicate recreation activity. No leisure time was listed for an additional 180 families.

Analysis of variance of recreation activity by leisure hours per week of the household head indicated that the means vary significantly at the 1-percent level (F ratio 2.8).

Significance between each of the individual means is indicated in appendix table 6.

USER PREFERENCES FOR OUTDOOR RECREATION FACILITIES

Although people may participate in various activities, they may not always engage in those from which they receive the greatest satisfaction. When a family engages in outdoor recreation as a group, and is faced with a set of available activities, it is often not possible to totally satisfy all members, since the activities that some individuals enjoy may not be available at all sites. Developers of recreation sites need to know the preferences of users or customers to provide activities desired by them. 6/

Facility Preferences

Preferences for various physical characteristics of recreation sites such as size of lake, fluctuations in water level, and topography of the adjacent area were considered in relation to specific recreation activities.

The size of lake preferred depends in part on the recreation activity. Small lakes are preferred for swimming and picnicking; large lakes are considered best for water skiing and boating. There appears to be little difference in size preference for fishing and camping. The expressed preferences are shown in table 16.

Table 16.--Size of lake preferred for water-oriented recreation activities, St. Louis, Mo., metropolitan area

Size of lake (acres)	Swimming	Water skiing	Camping	Picnicking	Boating	Fishing
	Percent					
0-4	30.6	7.8	9.0	22.8	4.7	7.0
5-24	21.7	8.1	18.5	17.6	6.4	16.8
25-49	10.7	9.1	14.0	13.7	9.3	16.0
50-99	13.4	12.2	16.9	18.7	16.3	15.1
100-499	10.0	22.3	16.4	12.7	22.7	19.3
500-999	4.9	18.6	9.5	7.0	14.9	9.4
1,000 and over	8.7	21.9	15.7	7.5	25.7	16.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Zoning particular areas for the activities most desired and best adapted to the topography seems to be a promising management tool for increasing the use of a particular lake and the surrounding recreation site. Fishing and power boating compete with and are generally detrimental to one another. Other

6/ For additional information on satisfaction received from specific recreation activities by various family members, see: Brewer, Durward and Gillespie, Glenn A., "Estimating Satisfaction Levels of Outdoor Recreationists." Jour. Soil and Water Conserv. Vol. 22, No. 6. Nov-Dec. 1967.

activities, such as picnicking, swimming, and camping, are complementary. Zoning these activities to specific areas may increase the use of the site and the enjoyment of the users. Most respondents (94.9 percent) favored zoning lakes for specific types of activity.

People have different attitudes toward topography surrounding a recreation site. Although it is difficult to change the topography of a large area, knowledge of users' preferences would be valuable in choosing among alternative sites when planning a development. More than one-third (38.3 percent) of the respondents preferred hilly terrain, compared with 24.4 percent for rolling land; 21.1 percent for flat areas; and 16.2 percent for mountainous surroundings.

Water level fluctuation is objectionable to many recreationists. Changes in the water level kill or damage vegetation around a lake, leave silt deposits exposed, reduce the quality of fishing, and increase the cost of operating and maintaining such facilities as docks, boathouses, and swimming beaches. Fluctuation is almost always present in multipurpose reservoirs. How much change can be tolerated without reducing the quality of the recreation experience, and at what season of the year, has been argued for years. When considering such multiple uses as electric power, flood control, water supply, and recreation, fluctuation does occur and definitely affects both the quantity and quality of the recreation use. The percentages of respondents who objected to various amounts of fluctuation in the water level are shown in table 17.

Table 17.--Objections to fluctuations in water levels of recreation lakes, St. Louis, Mo., metropolitan area

Fluctuation in feet	Respondents objecting 1/
	Percent
9 and over	100.0
8	92.2
7	91.3
6	91.0
5	87.1
4	77.2
3	68.5
2	52.1
1	29.1
Less than 1	10.8

1/ Total responses: 668.

Most of the respondents (72.8 percent) preferred a semiprivate recreation site; 14 percent wanted an isolated place in which to spend their time outdoors, while 13.2 percent desired an area of intensive use.

The kind and quality of facilities desired varied because husbands, wives, and children have different preferences. Children like remote, campout areas more than either wives or husbands. Wives like remote areas least of all. The desire for cooking facilities were about the same for all groups, but wives were the least enthusiastic about cooking on vacation. All groups wanted the area to be easily accessible, regardless of location. Many people reached remote wilderness camp areas by trail or on horseback. However, the largest percentage indicated a desire for comfortable motels with restaurants and easy accessibility. A good area development plan should provide all types of accommodations. The percentage distribution of people's preferences for accommodations are shown in table 18.

Table 18.--Preferences for recreation accommodations, St. Louis, Mo., metropolitan area

Type of accommodation	Husband	Wife	Children
	Percent		
Remote	26.2	20.0	31.5
Campout	33.4	23.7	48.3
Cooking facilities	53.7	49.8	51.5
Motel	63.3	72.5	63.1
Restaurants	65.1	74.4	71.7
Easily accessible	90.2	91.5	82.1

The topography, location, size of lake, and many other factors influence the type of recreation facilities that can be developed at a site. As many preferences as the available resources will permit should be satisfied. The respondents showed strong interest in good access roads, swimming, boating, and picnic grounds (table 19). Supporting items include sanitary facilities, parking lots, and water supply.

Seasonality of Use

One major economic problem faced by owners of recreation areas is the extreme fluctuation in the time of use. Attendance peaks in the summer and on major holidays and weekends, and is substantially lower at other periods. Because of this wide variation, capital investment, management, and other personnel are often inefficiently used. Fixed costs, such as interest on the investment, depreciation, and insurance, must be covered by returns on a limited number of days each year, resulting in a high average cost per visitor day. Any factor that would lengthen the season, or increase attendance in off-peak periods would help to reduce the cost per unit of use.

Facilities that offer a variety of activities desired by the majority of families would increase attendance, and could turn an unprofitable venture into one yielding a favorable return. The swimming season is mainly June, July, and

Table 19.--Facilities desired at a recreation lake, St. Louis, Mo., metropolitan area

Facilities	Percent
Access roads	72.8
Picnic grounds	72.9
Boating	53.4
Swimming	63.8
Water safety enforcement	68.9
Adequate fish stock	51.1
Cabins	46.4
Camping area	31.9
Water supply	73.5
Sanitary conveniences	87.6
Concession stand	40.0
Small general store	42.8
Parking	56.6
Other	7.6

August. By adding picnic grounds, a golf course, sightseeing trips, and quiet coves well-stocked with fish, the season could often be extended from April to October. This would tend to spread fixed costs over a longer time and to reduce the fixed cost per visit. The seasonality of various recreation activities is shown in figure 3.

Willingness to Pay Fees

Some administrators of public recreation areas contend that people object to paying fees and, therefore, a charge is not desirable. The results of the survey do not support this argument. Of the 840 respondents who had actually participated in water-oriented outdoor recreation, 745, or 88.7 percent, said they would be willing to pay an entrance fee for use for a desirable recreation facility. In addition to those who were willing to pay for a single activity facility, 1.9 percent said they would be willing to pay one fee for entrance into a complex which provided several types of recreation opportunities.

Approximately 10 percent would not pay a fee; they thought the area should be purchased by a government agency and made available to the public without charge. There was no significant relationship between willingness to pay an entrance fee and level of income.

Over two-thirds of the respondents in all income groups, except those in the $1,000 to $2,999 group indicated a willingness to pay entrance fees (table 20). Those with high incomes said they would pay more for most activities than those with low incomes.

FIGURE 3.--SEASONAL PARTICIPATION PATTERNS BY RECREATION ACTIVITY, ST. LOUIS, MO., METROPOLITAN AREA

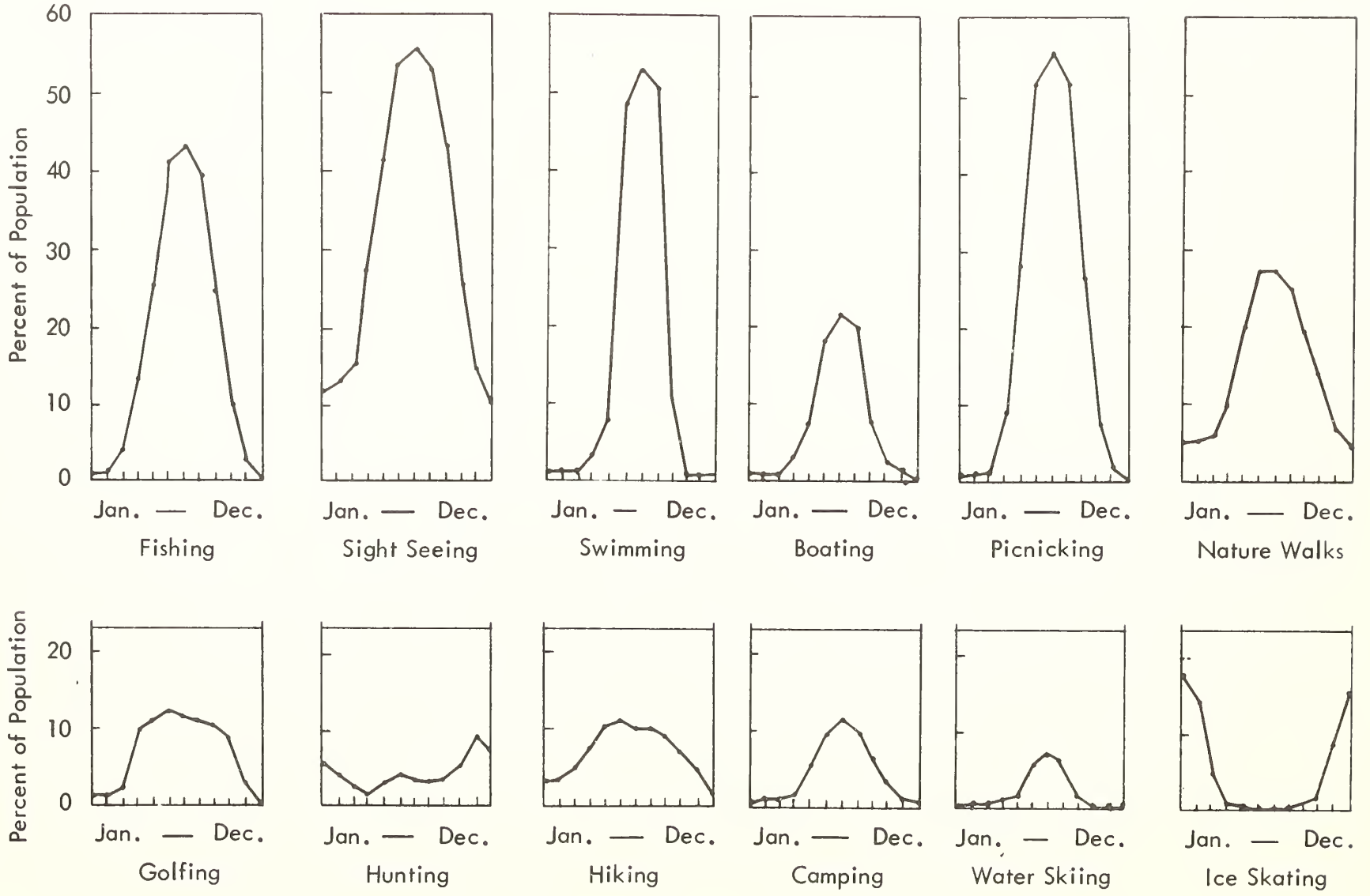


Table 20.--Expressed willingness to pay a fee to participate in water-oriented outdoor recreation, by income groups, St. Louis, Mo., metropolitan area

Family income group	Percentage of each income group willing to pay a fee
	Percent
Under $1,000	66.7
$1,000-$2,999	33.3
$3,000-$4,999	64.2
$5,000-$6,999	79.7
$7,000-$9,999	86.2
$10,000-$13,999	91.0
$14,000-$19,999	87.9
$20,000 and over	81.4
Y*	43.3
All families	74.5

Y*--Did not answer question on family income.

The mean fees indicated for each activity varied from 81¢ for hiking privileges to $2.29 for boat fishing. For all activities, the mean was $1.56 per activity (table 21).

Table 21.--Expressed willingness to pay by specific recreation activity, St. Louis, Mo., metropolitan area

Recreation activity	Entrance fee (arithmetic mean)
Swimming	$1.23
Water skiing	1.43
Ice skating	1.15
Camping	2.02
Picnicking	1.16
Boating	2.21
Fishing (boat)	2.29
Fishing (bank)	1.38
Hunting	2.17
Sightseeing	1.36
Nature walks	.89
Golfing	2.27
Hiking	.81
Various--other activities	2.25
Mean fee for all activities	1.56

As more private recreation areas are developed, and charges are made for their use, more information will be available for estimating the number of people who can be expected to use the services at different prices. However, the information presented here should provide useful guidelines for developers of new areas.

Distance and Recreation Activity

When traveling for water-oriented outdoor recreation, almost 90 percent of the trips (one-way) taken by the St. Louis population were less than 250 miles. Almost two-thirds were less than 100 miles. As distance increased, the number of trips decreased, but the number of days per trip increased. The number of trips of up to 49 miles was 14.1 per family, and decreased to 1.4 for distances of over 2,000 miles. Six hundred and seventy-two families took trips of varying duration. Trips averaged 7.6 per family, and the mean number of recreation days per trip was 5.24 (table 22). The most popular mode of transportation was by car, accounting for 97 percent of all trips.

Table 22.--Trips, by distance traveled, for water-oriented outdoor recreation, St. Louis, Mo., metropolitan area

Miles traveled (one-way)	Percentage of total trips	Trips per family (annual)	Average recreation period per trip
	Percent	Number	Days
0-49	27.5	14.1	2.47
50-99	34.7	10.1	4.13
100-149	17.0	8.2	4.76
150-249	10.7	4.8	8.11
250-499	2.4	3.9	8.90
500-999	2.6	2.3	21.39
1,000-1,999	2.3	1.9	22.53
2,000 +	0.3	1.4	35.50
Can't identify	2.5	13.3	2.32
All families	100.0	7.65	5.24

Families with annual incomes over $5,000 took more trips (6.3 for all distances) than did those who received less than $5,000 (2.4 trips per family). 6/

Vacations

Of all families interviewed, 53.6 percent received paid vacations in 1964. The number of vacations varied from one to four per family. Four hundred and one families received a total of 735 vacations--an average of 1.83 per family. The total number of vacation days received was 11,251 for an average of 15.3

6/ Computed for the total sample of 1,000 families.

per vacation. The average length of vacations for husbands was slightly higher than for wives; 16.2 compared to 14.9 days; and 14.5 days for other respondents. Vacations were taken throughout the year, but 64.9 percent were during June, July, and August; the rest were distributed almost equally among the other months. Approximately two-thirds (60.2 percent) were out of the State, and 7.8 percent out of the United States. Thirty-two percent were taken in Missouri (table 23).

Table 23.--Distribution of vacations taken by families, St. Louis, Mo., metropolitan area

Month	In Missouri	Out of State	Out of U.S.	Total
	Percent			
January	--	1.4	0.4	1.8
February	0.1	1.6	0.7	2.4
March	0.3	3.5	0.3	4.1
April	1.5	1.8	0.5	3.8
May	1.7	3.4	0.1	5.2
June	5.6	8.2	1.4	15.2
July	8.9	13.5	1.6	24.0
August	9.2	15.3	1.2	25.7
September	1.9	4.5	0.6	7.0
October	1.5	3.3	0.7	5.5
November	0.7	2.6	--	3.3
December	0.5	0.8	0.2	1.5
More than 1 month	0.1	0.3	0.1	0.5
Total	32.0	60.2	7.8	100.0

CONCLUDING REMARKS

Satisfactory data concerning recreation activity and preferences can be obtained from an interview sample survey and correlated in a statistically significant manner with socioeconomic characteristics of a metropolitan population. The characteristics influencing participation in outdoor recreation were family income, education, sex, age, race, occupation, and leisure time.

The data presented identify relationships existing between various characteristics and participation in water-oriented outdoor recreation activities. Analyses of variance were computed for each relationship to determine its level of significance. Duncan's new multiple range test was used to determine the significance of sub-groups of each characteristic. This type of statistical analysis is useful, but does not allow the researcher to quantify the net effect of each variable. Nor does it measure the effect of interrelationships among the characteristics. A more detailed analysis was believed necessary, and was presented in a companion report by the authors (see Gillespie and Brewer, ERS-402, Selected Bibliography).

The study reported here was made in one locality at one point in time, with participants facing a specific supply of recreation opportunities. The analysis is based on a static situation. Significant changes in the availability of recreation facilities could be expected to change the recreation activity levels presented.

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APPENDIX

Appendix table 1.--Respondents, household heads, and family characteristics of the sample, St. Louis, Mo., metropolitan area

Persons	Number
Respondents:	
Married males	419
Married females	419
Other males	41
Other females	121
Total	1,000
Household heads:	
Married males	802
Married females	31
Others	167
Total	1,000
Persons in sample:	
Husbands	838
Wives	838
Children	1,444
Mothers of respondents	34
Fathers of respondents	4
Mothers-in-law	11
Fathers-in-law	3
Others	256
Total	3,428

DUNCAN'S NEW MULTIPLE RANGE TEST (DNMRT)

In appendix tables 2 through 6 the "new multiple range test" developed by Duncan, David B., Biometrics 11:1-42, 1955 was computed. The test is used to determine the significance between the means (average annual recreation days per family) for different subclasses of the socioeconomic factors; income, education, age, occupation, and leisure time.

The data necessary to perform the test are (a) the means, (b) the standard error of the means, (c) the degrees of freedom on which this standard error is based.

$R_p = Q\ \sigma_{\bar{X}}$ -- the shortest significant range

where:

Q = tabular value for p and n
N = number of observations
P = number of positions inclusive separating any two means
$\sigma_{\bar{X}}$ = standard error of mean

The tests were all computed for the 5-percent level of significance.

Appendix table 2.--Family income and family recreation days, St. Louis, Mo., metropolitan area

Total family income	Sub-class	Average annual recreation days per family	Families reporting
Under $1,000	A	9.1	9
$1,000-$2,999	B	7.8	99
$3,000-$4,999	C	14.1	187
$5,000-$6,999	D	27.4	217
$7,000-$9,999	E	27.0	188
$10,000-$13,999	F	34.6	145
$14,000-$19,999	G	39.1	66
$20,000 and over	H	65.2	59
Y*		--	30
Total			1,000

Y*--Did not answer income question.

DNMRT

P:	(2)	(3)	(4)	(5)	(6)	(7)	(8)
R_p	3.64	3.88	4.02	4.11	4.19	4.24	4.30

B	A	C	E	D	F	G	H
7.8	9.1	14.1	27.0	27.4	34.6	39.1	65.2

Note: Any two means not underscored by the same line are significantly different. Any two means underscored by the same line are not significantly different. In this sample, for example, the average recreation days for income subclass A (under $1,000) and subclass B ($1,000-$2,999) did not prove significantly different at the 5-percent level.

Appendix table 3.--Education and family recreation days, St. Louis, Mo., metropolitan area

Education of household head (years completed)	Sub-class	Average annual recreation days per family	Families reporting
Elementary:			
1-4	A	13.5	22
5-7	B	12.7	86
8	C	21.0	168
High School:			
9-11	D	23.3	155
12	E	25.3	266
College:			
13-15	F	38.8	101
16	G	34.9	113
17 +	H	45.5	83
Y*		--	6
Total			1,000

Y*--Did not answer education question.

DNMRT

P:	(2)	(3)	(4)	(5)	(6)	(7)	(8)
R_p	3.79	4.00	4.14	4.23	4.32	4.37	4.43

B	A	C	D	E	G	F	H
12.7	13.5	21.0	23.3	25.3	34.9	38.8	45.5

Appendix table 4.--Age and family recreation days, St. Louis, Mo., metropolitan area

Age of household head	Sub-class	Average annual recreation days per family	Families reporting
Under 20	A	2.0	3
20-24	B	29.6	41
25-29	C	21.7	72
30-34	D	31.2	86
35-39	E	32.9	104
40-44	F	33.5	132
45-49	G	32.8	90
50-54	H	32.8	113
55-59	I	22.5	88
60-64	J	20.3	98
65-69	K	23.9	67
70-74	L	14.8	62
75-79	M 1/	12.3	26
80-84	--	--	11
85 and older	--	--	2
Y*	--	--	5
Total			1,000

Y*--Did not answer age question.

1/ Subclass M includes 75 years and older.

DNMRT

P:	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R_p	3.85	4.06	4.20	4.30	4.38	4.43	4.49	4.53	4.57	4.60	4.70

A	M	L	J	C	I	K	B	D	G&H	E	F
2.0	12.3	14.8	20.3	21.7	22.5	23.9	29.6	31.2	32.8	32.9	33.5

Appendix table 5.--Occupation and family recreation days, St. Louis, Mo., metropolitan area

Occupation of household head	Sub-class	Average annual recreation days per family	Families reporting
Professional	A	37.1	106
Administrator	B	35.7	139
Technical	C	30.0	80
Services	D	28.1	203
Clerical	E	19.1	71
Laborer	F	27.2	152
Housewife	G	11.0	66
Unemployed	H	11.4	15
Other 1/	I	21.7	157
Y*		--	11
Total			1,000

Y*--Did not answer occupation question.

1/ Primarily retired.

DNMRT

P:	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
R_p	3.85	4.06	4.20	4.30	4.38	4.43	4.49	4.53

G	H	E	I	F	D	C	B	A
11.0	11.4	19.1	21.7	27.2	28.1	30.0	35.7	37.1

Appendix table 6.--Leisure time and family recreation days, St. Louis, Mo., metropolitan area

Leisure hours per week of household head	Sub-class	Average annual recreation days per family	Families reporting
1-9	A	15.8	11
10-19	B	27.4	41
20-29	C	30.4	95
30-39	D	31.9	187
40-49	E	32.3	278
50-59	F	27.0	138
60-69	G	11.7	25
70-79	H	8.6	16
80 +	I	6.2	17
Y*		--	12
No leisure time listed		--	180
Total			1,000

Y*--Did not answer leisure time question.

DNMRT

P:	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
R_p	3.85	4.06	4.20	4.30	4.38	4.43	4.49	4.53

I	H	G	A	B	F	C	D	E
6.2	8.6	11.7	15.8	27.4	29.0	30.4	31.9	32.3

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